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CLAIMS

1. A catalyst useful for removal of hydrogen sulphide from gas streams containing the same and its conversion to elemental sulphur, the said catalyst comprising 0 to 95 % by weight clay, 0 to 95 % by weight gypsum and 0 to 95 % by weight alumina and 5 to 60 % by weight hydrated iron oxide and heated to temperatures between 100 and 650°C for activation.
2. A catalyst as claimed in claim 1, wherein said catalyst comprising 5 to 60 % by weight clay, 5 to 80 % by weight gypsum and 5 to 40 % by weight alumina and 6 to 40 % by weight hydrated iron oxide.
3. A catalyst as claimed in claim 1, wherein clays are selected form the group comprising Kalonite, Montomorillonite /Semectite, Illite and Chlorite.
4. A catalyst as claimed in claim 3, wherein clays are selected form the Semecrite group.
5. A catalyst as claimed in claim 4, wherein clay used is bentonite clay.
6. A catalyst as claimed in claim 1, wherein said catalyst contains ferric ions as active sites, which chemisorbs hydrogen sulphide present in the gas stream and converts the same into elemental sulphur.
7. A catalyst as claimed in claim 1, wherein said catalyst has pH value in the range of 8.0 to 10.0.
8. A catalyst as claimed in claim 1, wherein said catalyst is heat treated at temperature in the range of 100° C to 650° C before use for activating the same.
9. A catalyst as claimed in claim 1, wherein 100 gm of said catalyst chemisorbs 2860 to 28600 mg of hydrogen sulphide from said gas stream in one cycle.
10. A catalyst as claimed in claim 1, wherein said spent catalyst containing sulphides of iron is regenerated by passing air through the same at ambient temperature.
11. A catalyst as claimed in claim 1, wherein regenerated catalyst treats and removes hydrogen sulphide, from the gas stream and converts the same to elemental sulphur in the subsequent cycles of chemisorption and regeneration.
12. A catalyst as claimed in claim 1, wherein the catalyst is used in at least 15 chemisorption and regeneration cycles during its use.
13. A catalyst as claimed in claim 1, wherein sulphides of iron present in the spent catalyst is converted to Fe_2O_3 during regeneration thereby producing elemental sulphur and regenerating the catalyst.

14. A catalyst as claimed in claim 1, wherein the elemental sulphur recovered has purity more than 99 %.

15. A catalyst as claimed in claim 1, wherein said catalyst is used in fixed bed reactors or fluidized bed reactors.

16. A catalyst as claimed in claim 1, wherein said catalyst is divided into fine particles having particle size in the range of 100 μm to 2000 μm for use in the fluidized bed reactor.

17. A catalyst as claimed in claim 1, wherein said catalyst is pelletized or granulated to obtain pellets/ granules having diameter in the range of 0.5 mm to 10.0 mm for use in fixed bed reactors.

18. A process for preparing a catalyst useful for removing hydrogen sulphide from a gas stream and recovering elemental sulphur therefrom, said process comprising the steps of:

a) mixing of 0 to 95 % by weight clay, 0 to 95 % by weight gypsum, 0 to 95 % by weight alumina and 5 to 60 % by weight hydrated iron oxide; and

b) granulating, pelletizing or pulverizing the mixture of step (a) and heating the same at temperature in the range of 100^{0}C to 650^{0}C to obtain the catalyst.

19. A process as claimed in claim 18 wherein in step (a), the hydrated iron oxide is prepared from commonly available salts of iron such as ferric nitrate, ferric chloride, ferric sulphate and commonly available alkali such as ammonium hydroxide, sodium hydroxide and potassium hydroxide.

20. A process as claimed in claim 18, wherein 100 gm of the catalyst thus obtained chemisorb 2860 to 28600 mg of hydrogen sulphide gas from the gas stream.

21. A process as claimed in claim 18, wherein the catalyst thus obtained has pH value in the range of 8.0 to 10.0.

22. A process as claimed in claim 18, wherein the catalyst thus obtained is used in fixed bed reactor or fluidized bed reactor.

23. A process as claimed in claim 18, wherein catalyst thus obtained contain ferric ions as active sites.

24. A process as claimed in claim 18, wherein the catalyst thus obtained is pulverized into fine particles for use in fluidized bed reactors.

25. A process as claimed in claim 18 wherein in step (b), the mixture of step (a) is pelletized or granulated to obtain pellets/ granules having diameter in the range of 0.5 mm to 10 mm for use in fixed bed reactors.

26. A method for removal of sulphur compounds from a gas stream comprising the same and recovery of elemental sulphur therefrom, said method comprising the steps of :

a) mixing moist air/ water with the gas stream comprising the sulphur compounds for converting the sulphur compound to hydrogen sulphide.

b) Contacting the gas stream containing hydrogen sulphide with a catalyst comprising to 0 to 95 % by weight clay, 0 to 95 % by weight gypsum, 0 to 95 % by weight alumina and 5 to 60 % by weight hydrated iron oxide to remove hydrogen sulphide by chemisorption, and

c) regenerating the spent catalyst by passing air through or over the same to oxides of iron and converting iron sulphides to iron oxides and elemental sulphur.

27. A method as claimed in claim 26, wherein compounds of sulphur are hydrogen sulphide, carbonyl sulphide (COS), and carbon disulphide (CS_2) and mixtures thereof.

28. A method as claimed in claim 26, wherein the gas streams containing hydrogen sulphide from trace level to 100% level is treated to get outlet gas stream free of the same.

29. A method as claimed in claim 26, wherein the color of the catalyst changes from reddish brown to black during step (b) chemisorption and it changes back to reddish brown on regeneration, this property being useful in visually monitoring the progress of the chemisorption and regeneration cycles respectively.

30. A method as claimed in claim 26, wherein the spent catalyst is regenerated by passing an oxygen containing gas through or over the same.

31. A method as claimed in claim 26, wherein removal of the sulphur compound from the gas stream and regeneration of catalyst are optionally carried out simultaneously.

32. A method as claimed in claim 26, wherein removal of the sulphur compound from the gas stream and regeneration of catalyst are simultaneously carried out by

contacting gas stream containing sulphur compounds & an oxygen containing gas simultaneously with the catalyst.

33. A method as claimed in claim 26, wherein the rate of simultaneous reaction and regeneration of catalyst depends on the flow rates of gas stream, and ratio of gas stream and oxygen containing gas as well as the hydrogen sulphide content of the gas stream.

34. A method as claimed in claim 26, wherein the percentage of regeneration of spent catalyst is 100% when oxygen containing gas is passed through or over the spent catalyst.

35. A method as claimed in claim 26, wherein the process is carried out in fluidized bed reactors or fixed bed reactors.

36. A method as claimed in claim 26, wherein the elemental sulphur obtained has purity more than 99 %.

37. A method as claimed in claim 26, wherein 100 gm of said catalyst chemisorbs 2860 to 28600 mg of hydrogen sulphide from said gas stream in one cycle.

38. A catalyst useful for removal of hydrogen sulphide from gas streams containing the same and its conversion to elemental sulphur substantially as herein described and illustrated therein.